

PATENT SPECIFICATION

Inventor: ROBERT WILLIAM EADIE.

675,754



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PROVISIONAL SPECIFICATION

Improvements in or relating to Reciprocating Pumps

We, JOHN GANE SHIRLEY BARROW and
MICHAEL WENTWORTH LEWART-WENT-
WORTH both British Subjects of 41

pinion arranged at the other side of the 40
fixed pinion and annulus, whereby the

ERRATUM

SPECIFICATION NO. 675754

In the heading on Page 1, for "No. 9594/49" read "No. 9594/48".

THE PATENT OFFICE,

24th November, 1952

DB 39980/2(5)/3337 100 11/52 R

20 surface in the axial direction of said
swash plate which is provided with a
number of circumferential teeth in
engagement with a planetary pinion
which also meshes with a fixed pinion
25 coaxial with said swash plate and having
a different number of teeth, the planetary
pinion being planetated by means of a
driving annulus.

30 In a simple construction, the swash
plate comprises a pinion of somewhat
smaller diameter arranged coaxially with
a fixed pinion, both said pinions being in
mesh with the planetary pinion which
planetates between the fixed pinion and
35 annulus being driven by means of a worm
engaging on its periphery formed as a
worm wheel.

The planetary pinion may be elongated
so as to engage upon a second swash plate

action of the planetary pinion causes a
differential relative rotation between the
swash plate and fixed pinions.

The second form of construction is con-
veniently made use of when it is desired
to eliminate worm and worm wheel gear-
ing and to use straight cut gears only.

The constructions of the pump
described above permit a regular and very
small amount of liquid to be pumped at
substantially high pressures, and the
invention is of particular use in, for
example, complex machinery wherein a
plurality of bearings require minute
quantities of oil at regular but infrequent
intervals.

Dated this 6th day of April, 1948.

CHATWIN & COMPANY,

253, Gray's Inn Road,

London, W.C.1,

Patent Agents for the Applicants.

[Price 2/8]

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PROVISIONAL SPECIFICATION

Improvements in or relating to Reciprocating Pumps

We, JOHN GANE SHIRLEY BARROW and MICHAEL WENTWORTH EWART-WENTWORTH, both British Subjects, of 44, Montrose Place, Chapel Street, London, and 2, New Square, Lincoln's Inn, London, W.C.2, respectively, do hereby declare the nature of this invention, to be as follows:—

This invention relates to pumps of the kind in which a plurality of pistons are actuated by a cam drive, its object being to provide an improved construction having a very high reduction gear.

According to the present invention, a pump comprises a plurality of pistons arranged in a cylinder member or members and actuated by the rotation relative thereto of a swash plate or cam surface in the axial direction of said swash plate which is provided with a number of circumferential teeth in engagement with a planetary pinion which also meshes with a fixed pinion coaxial with said swash plate and having a different number of teeth, the planetary pinion being planetated by means of a driving annulus.

In a simple construction, the swash plate comprises a pinion of somewhat smaller diameter arranged coaxially with a fixed pinion, both said pinions being in mesh with the planetary pinion which planetates between the fixed pinion and internal teeth on the annulus, the said annulus being driven by means of a worm engaging on its periphery formed as a worm wheel.

The planetary pinion may be elongated so as to engage upon a second swash plate

pinion arranged at the other side of the fixed pinion and annulus, whereby the pump can have a double set of pistons.

In a second form of construction, the swash plate may itself form a pinion, and have teeth on its periphery to engage with the planetary pinion which is also in mesh with a fixed pinion arranged adjacent to the swash plate. The planetary pinion is planetated by the rotation of the driving annulus by which it is carried, and which is in turn driven by means of a spur gear coacting with teeth thereon.

The swash plate pinion and the fixed pinion have the same pitch circle to engage with the planetary pinion, but have a number of teeth differing by a small number, whereby the planetary action of the planetary pinion causes a differential relative rotation between the swash plate and fixed pinions.

The second form of construction is conveniently made use of when it is desired to eliminate worm and worm wheel gearing and to use straight cut gears only.

The constructions of the pump described above permit a regular and very small amount of liquid to be pumped at substantially high pressures, and the invention is of particular use in, for example, complex machinery wherein a plurality of bearings require minute quantities of oil at regular but infrequent intervals.

Dated this 6th day of April, 1948.

CHATWIN & COMPANY,

253, Gray's Inn Road,

London, W.C.1,

Patent Agents for the Applicants.

[Prior 2/8]

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COMPLETE SPECIFICATION

Improvements in or relating to Reciprocating Pumps

We, JOHN GANE SHIRLEY BARROW and
MICHAEL WENTWORTH EWART-WENT-
worth, both British Subjects, of 44,
Montrose Place, Chapel Street, London,
5 and 2, New Square, Lincoln's Inn,
London, W.C.2. respectively do hereby
declare the nature of this invention and
in what manner the same is to be per-
formed, to be particularly described and
10 ascertained in and by the following state-
ment:—

This invention relates to pumps of the
kind in which a plurality of pistons are
actuated by a cam drive, its object being
15 to provide an improved construction hav-
ing a very high reduction gear.

According to the present invention, a
pump comprises a plurality of pistons
arranged in cylinders and actuated, by
20 the rotation of a cam, in the axial direc-
tion of said cam which is provided with a
number of circumferential teeth in en-
gagement with a planetary pinion which
also meshes with a fixed pinion
25 coaxial with the cam and having a
different number of teeth, the planetary
pinion being moved in an annular path
about the said fixed pinion by means of a
driving annulus.

30 In a simple construction, the cam com-
prises a pinion arranged coaxially with
another fixed pinion, both said pinions
being in mesh with the planetary pinion
which is moved in an annular path
35 between the fixed pinion and internal
teeth on the annulus, the said annulus
being driven by means of a worm engag-
ing teeth on its periphery.

The planetary pinion may be elongated
40 so as to engage with the pinion of a second
cam arranged at the other side of the
fixed pinion, whereby the pump can have
a double set of pistons.

In a second form of construction, the
45 cam may itself form a pinion, and have
teeth on its periphery to engage with the
planetary pinion which is also in mesh
with a fixed pinion arranged adjacent to
the cam. The planetary pinion is moved
50 in an annular path about the fixed pinion
by the rotation of the driving annulus by
which it is carried, and which is in turn
driven by means of a spur gear coacting
with teeth thereon.

55 The cam pinion and the fixed pinion
have the same pitch circle to engage with
the planetary pinion, but have a number
of teeth differing by a small number,
whereby the planetary action of the

planetary pinion causes a differential 60
relative rotation between the cam plate
and fixed pinions.

The second form of construction is con-
veniently made use of when it is desired
to eliminate worm and worm wheel gear- 65
ing and to use straight cut gears only.

The constructions of the pump
described above permit a regular and very
small amount of liquid to be pumped at
substantially high pressures, and the 70
invention is of particular use in, for
example, complex machinery wherein a
plurality of bearings require minute quan-
tities of oil at regular but infrequent
intervals. 75

In order that the invention may be
more fully understood it is shown by
way of example in the accompanying
drawing wherein:—

Fig. 1 is a vertical section through a 80
first construction, and

Fig. 2 is a vertical section through a
second construction.

In Fig. 1, 1 is a cam fast to a pinion 2
and loosely mounted on an axle 3 which is 85
made fast to the casing and carries a fixed
pinion 4. 5 is a planetary pinion which
engages with the outside of pinions 2 and
4 and with the inside of an annulus 6 pro-
vided with internal teeth 7 and driven by 90
means of a worm 8 engaging on gearing
9 on its outer circumference. 10 are
pistons actuated axially in cylinders 11
by the rotation of the cam 1.

Only one cam 1 is shown in this figure 95
for clarity but it can be seen that another
similar cam could be provided on the
right hand pinion 12 which is in all
respects similar to pinion 2, and said
second cam could be made to operate 100
another set of pistons, similar to pistons
10 but placed at the right hand side of
Fig. 1.

In Fig. 2, 13 represents pistons which
are movable in cylinder members 14 and 105
are actuated by a cam 15 having circum-
ferential gearing 16, engaging with a
planetary pinion 17 which also meshes
with a fixed pinion 18 coaxial with the
cam 15, by means of gearing 19. The cam 110
15 is provided with gearing 16 which has
a small number of teeth either more or
less than the gearing 19 of the fixed
pinion 18. The planetary pinion 17 is
carried round the pinion 18 and plate 15 115
by an annulus 20 having internal gearing
21 and driven by means of a driving
pinion 22. 23 is a balance weight which

can optionally be provided on the annulus 20 to balance the planetary pinion 17.

Having now particularly described and ascertained the nature of our said invention, and in what manner the same is to be performed, we declare that what we claim is:—

1. A pump comprising a plurality of pistons arranged in cylinders and actuated, by the rotation of a cam, in the axial direction of said cam which is provided with a number of circumferential teeth in engagement with a planetary pinion which also meshes with a fixed pinion coaxial with the cam and having a different number of teeth, the planetary pinion being moved in an annular path about the said fixed pinion by means of a driving annulus.
2. A pump as claimed in claim 1 wherein the planetary pinion is moved in an annular path between the circumferential teeth of the cam and fixed pinion and internal teeth formed on the annulus.
3. A pump as claimed in claims 1 and 2 wherein the annulus is driven by means of a worm engaging with suitable teeth on the periphery of the annulus.
4. A pump as claimed in claims 1, 2, or 3 wherein the planetary pinion is elongated to permit engagement with the pinion of a second cam disposed at the other side of the fixed pinion and actuating another set of similar pistons.

gated to permit engagement with the pinion of a second cam disposed at the other side of the fixed pinion and actuating another set of similar pistons.

5. A pump as claimed in claim 1 wherein the planetary pinion is rotatably carried by the annulus.

6. A pump as claimed in claim 5 wherein the annulus is driven by means of a driving pinion engaging with teeth on the said annulus.

7. A pump as claimed in any one of the preceding claims, wherein the fixed pinion and the or each cam have the same pitch circle.

8. A pump as claimed in any one of claims 5, 6, or 7 wherein the annulus is provided with a counterbalance weight to balance the planetary pinion.

9. A pump as claimed in any one of the preceding claims, constructed and arranged substantially as shown in the several figures of the accompanying drawing.

Dated this 26th day of August, 1948.

CHATWIN & COMPANY,

253, Gray's Inn Road,

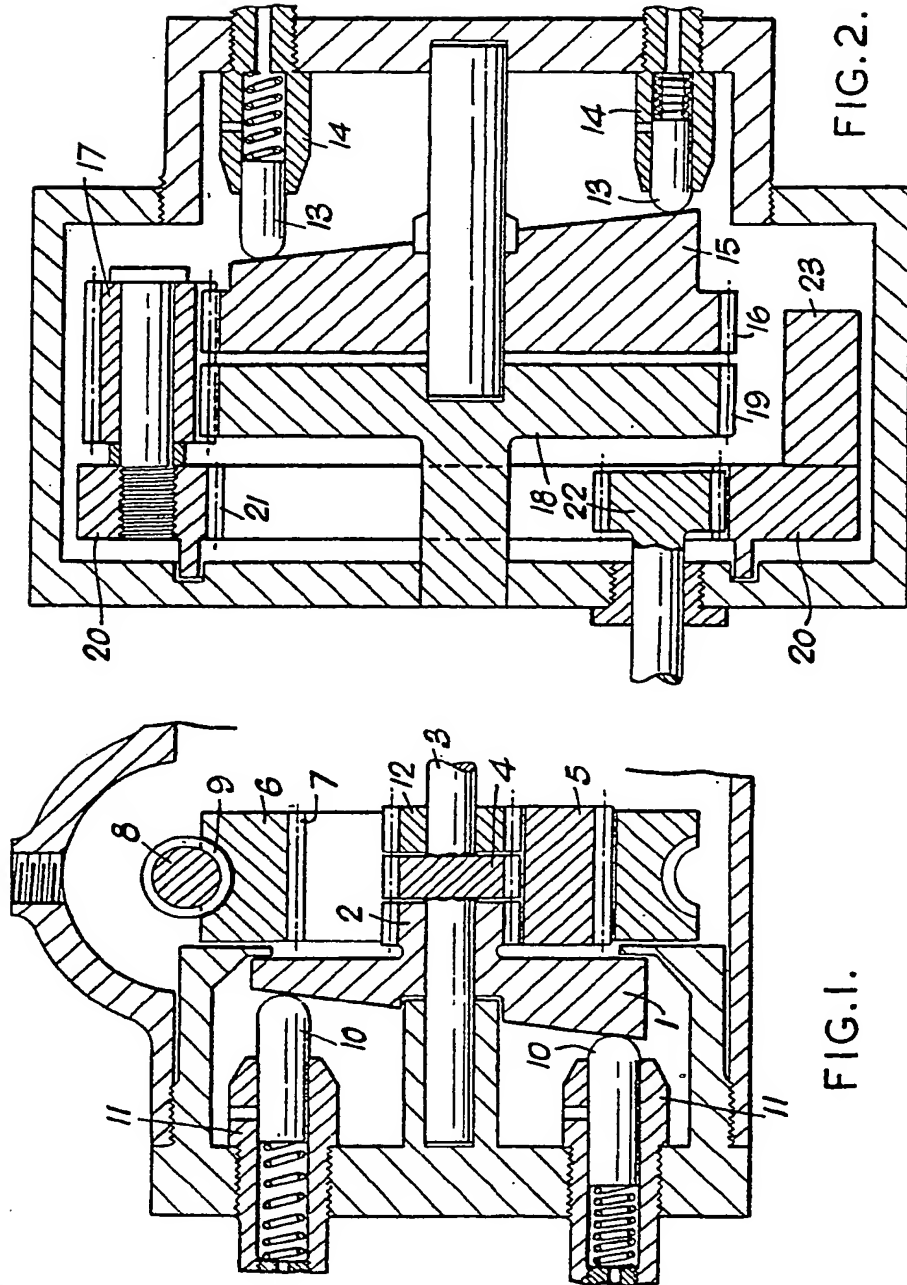
London, W.C.1,

Patent Agents for the Applicants.

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675,754 COMPLETE SPECIFICATION
1 SHEET

This drawing is a reproduction of
the Original on a reduced scale.



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